WE CLAIM:

1. A micromirror assembly, comprising:

a micromirror having a reflective top surface and a bottom surface;

a support member having a member end; and

the support member end supporting the micromirror for controllable tilting relative to the member end.

2. The assembly of claim 1 further comprising liquid positioned relative to the bottom surface such that capillary force of the liquid holds the micromirror on the support member.

3. The assembly of claim 2 wherein the liquid has a low vapor pressure.

4. The assembly of claim 3 wherein the low vapor pressure is less than 0.01 mm mercury at 25 degrees C.

5. The assembly of claim 2 wherein the liquid is an oil.

6. The assembly of claim 1 wherein the bottom surface has a centrally positioned depression and the end engages in the depression.

7. The assembly of claim 1 wherein the end is a pointed end.

8. The assembly of claim 1 wherein the micromirror is able to pivot in any direction about an axis of the pointed end.

9. The assembly of claim 1 wherein the bottom surface has a centrally positioned slot, and the end engages in the slot.

10. The assembly of claim 1 wherein the end is an elongate edge deposed in the slot so that the micromirror can tilt about an axis of the slot.

11. The assembly of claim 1 wherein the support member comprises a pin.

12. The assembly of claim 1 wherein the support member comprising a cone.

13. The assembly of claim 1 wherein the support member comprising a needle.

14. The assembly of claim 1 wherein the end is made of sapphire.

15. The assembly of claim 1 wherein the support end has a hardness greater than Mohs Scale 8.

16. The assembly of claim 1 wherein the micromirror has a round disc shape.

17. The assembly of claim 1 wherein the micromirror is symmetrical about its vertical axis.

18. The assembly of claim 1 wherein the micromirror has a diameter of generally between 100 and 200 microns.

19. The assembly of claim 1 further comprising a beam source oriented so that an incident beam therefrom hits a center of the reflective surface.

20. The assembly of claim 1 further comprising a beam source oriented so that an incident beam therefrom hits the reflective surface at a location spaced from a center of the reflective surface.

21. The assembly of claim 1 further comprising a plurality of beam sources oriented so that their respective beams hit the reflective surface at different locations thereon.

22. The assembly of claim 21 wherein each of the beam sources is an optical fiber.

23. The assembly of claim 1 wherein the micromirror is tiltable about two, three or four equally spaced axes perpendicular to an axis of the member end.

24. The assembly of claim 1 wherein the micromirror is round and has a diameter of generally 200 micrometers.

25. The assembly of claim 1 further comprising an electromagnet on a support surface below the bottom surface.

26. The assembly of claim 25 wherein the electromagnet is sputtered on the support surface.

27. The assembly of claim 25 wherein the electromagnet includes a sputtered core and a sputtered winding on the core.

28. The assembly of claim 1 further comprising a magnet on the bottom surface.

29. The assembly of claim 28 wherein the magnet coats the entire bottom surface.

30. The assembly of claim 28 wherein the magnet is only on peripheral areas of the bottom surface.

31. The assembly of claim 28 wherein the magnet is a mixture of zumarium, cobalt and nickel.

32. The assembly of claim 28 wherein the magnet is sputter coated on the bottom surface.

33. The assembly of claim 28 wherein the magnet is a permanent magnet.

34. The assembly of claim 28 wherein the magnet is an electromagnet.

35. The assembly of claim 1 further comprising a substrate, the support member being a horizontal elongate member, the elongate member having an elongate edge defining the member end, the bottom surface having an elongate upwardly-disposed surfaced, and the elongate edge being disposed in the upwardly-disposed surface.

36. The assembly of claim 35 wherein the upwardly-disposed surface is a groove on the bottom surface.

37. The assembly of claim 35 further comprising liquid in the upwardly-disposed surface which exerts a capillary holding action on the micromirror.

38. The assembly of claim 35 further comprising electromagnets on either side of the elongate member to cause the micromirror to controllably tilt from side to side.

39. The assembly of claim 38 further comprising a substrate, the elongate member being supported by and extending up from the substrate, and the electromagnets being supported on the substrate.

40. An optical switch, comprising:

a micromirror; and

a central pin or cone hinging the micromirror and allowing the micromirror to switch into a plurality of predefined positions.

41. The switch of claim 40 wherein the micromirror is an electromagnetically-controlled micromirror.

42. The switch of claim 40 wherein the micromirror is an electrostatically-operated micromirror.

43. The switch of claim 40 wherein the micromirror is in a helium chamber.

44. The switch of claim 40 wherein the micromirror is in a vacuum chamber.

45. The switch of claim 40 wherein the micromirror has a top reflective surface.

46. The switch of claim 45 wherein the top reflective surface is a flat planar surface.

47. The switch of claim 45 wherein the top reflective surface is a concave surface.

48. The switch of claim 45 wherein the top reflective surface is a convex surface.

49. The switch of claim 40 further comprising liquid catanoid holding the micromirror to the pin or cone with capillary force.

50. The switch of claim 49 wherein the liquid is oil.

51. The switch of claim 49 wherein the pin extends up from a substrate and a lower surface of the liquid is on the substrate.

52. The switch of claim 49 wherein an area of the lower surface has a rougher surface than a portion of the lower surface surrounding the area such that a perimeter of the area defines the outer boundary of the liquid.

53. The switch of claim 40 further comprising a substrate below the micromirror and up from which the pin extends.

54. The switch of claim 53 wherein the micromirror, when in a tilted position, impacts the substrate.

55. The switch of claim 54 wherein a magnet is supported by the substrate to controllably move the micromirror to the tilted position.

56. The switch of claim 55 wherein the magnet is disposed between the tilted position and the pin.

57. The switch of claim 55 wherein the magnet is an electromagnet.

58. The switch of claim 57 wherein the magnet is an electromagnet includes a core material sputtered on the substrate and current-carrying coils sputtered on the core material.

59. The switch of claim 40 further comprising an electromagnet generally positioned below an edge of the micromirror to controllably move the micromirror to one of the predefined positions.

60. The switch of claim 59 wherein the electromagnet defines a first electromagnet, and further comprising a second electromagnet generally positioned below another edge of the micromirror to controllably move the micromirror to another of the predefined positions.

61. The switch of claim 59 wherein the electromagnet defines a first electromagnet and further comprising a second electromagnet generally positioned above an edge of the micromirror to controllably move the micromirror to another of the predefined positions.

62. The switch of claim 61 wherein the second electromagnet is positioned directly above the first electromagnet.

63. The switch of claim 62 wherein an edge of the micromirror which impacts a substrate therebelow when moved to one of the predefined positions has a hardened surface.

64. The switch of claim 40 wherein the micromirror has a bottom surface with a depression, an end of the central pin being disposed in the depression.

65. The switch of claim 40 wherein the micromirror is square and has length of generally 300 micrometers.

66. The switch of claim 40 further comprising a base supporting the central pin or cone, and a plurality of equally spaced microelectromagnets disposed beneath a perimeter edge of the micromirror and supported on the base.

67. The switch of claim 66 wherein the plurality of equally spaced microelectromagnets comprise two, four or eight equally spaced microelectromagnets.

68. The switch of claim 66 wherein the plurality of equally spaced microelectromagnets comprise eight microelectromagnets and the micromirror has an octagonal shape.

69. The switch of claim 40 further comprising a liquid holding by capillary action the micromirror on the pin or cone.

70. The switch of claim 69 wherein the liquid is an oil.

71. The switch of claim 70 wherein the oil is a non-corrosive, semi-synthetic oil blended from high viscosity index paraffin base oils.

72. The switch of claim 70 wherein the oil forms a catenoid shape.

73. The switch of claim 40 wherein the switch is adapted to switch at a speed of between one to ten milliseconds.

74. The switch of claim 40 wherein an upper tip of the pin or cone has a Mohs hardness of about nine.

75. The switch of claim 40 wherein the switch is mounted in an array of similar switches.

76. The switch of claim 75 wherein the array is a 500 by 500, 200 by 600 or 100 by 100 array.

77. The switch of claim 40 wherein the angle between the incident and reflective beam on the micromirror is between two and twenty degrees.

78. The switch of claim 40 wherein the micromirror includes a mirror having a thickness less then 200 microns.

79. The switch of claim 40 wherein the micromirror has a tilt angle of generally sixteen degrees.